Disasters: Are they getting bigger?

Are Mega-Disasters more likely and can we build sufficient resilience to withstand them?

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A Mega-Disaster can be defined as an:-

An unexpected natural or man-made catastrophe of exceptional magnitude and/or causing unusually severe or unprecedented damage. An unforeseen event of any kind with exceptionally unpleasant, distressing, or unfortunate results.

We generally associate a Mega-Disaster with high energy rapid onset events such as earthquakes in Pakistan (2005), China (2008), Japan (2011) and New Zealand (2011), tsunami in Japan (2011), floods in Thailand (2011) and cyclones on Myanmar (2014) and The Philippines (2014).

We know that disasters often lead to loss of life.

Between 1970-2015 there were almost 4 million deaths from disasters (EMDAT)

But between 1970 – 2010 almost 900, 000 die from drought - mainly Africa (WB 2010).

But drought is a slow onset disaster and rarely reported.

But is a high energy rapid onset event to narrow a view of disasters?

1.25m road traffic deaths in 2013 (WHO, 2015)
Continued conflict in Afghanistan, Iraq, Syria and Africa.
Increasing numbers of refugees with many dying as they try to reach Europe

Could these be considered as slow onset Mega-Disasters?

Though definitions are important we do need to focus on the likelihood of future mega-disasters and how to cope with them.

It is highly likely that produced disasters will dominate.

Accelerated climate change and increasing variability is one of the greatest threats we face.

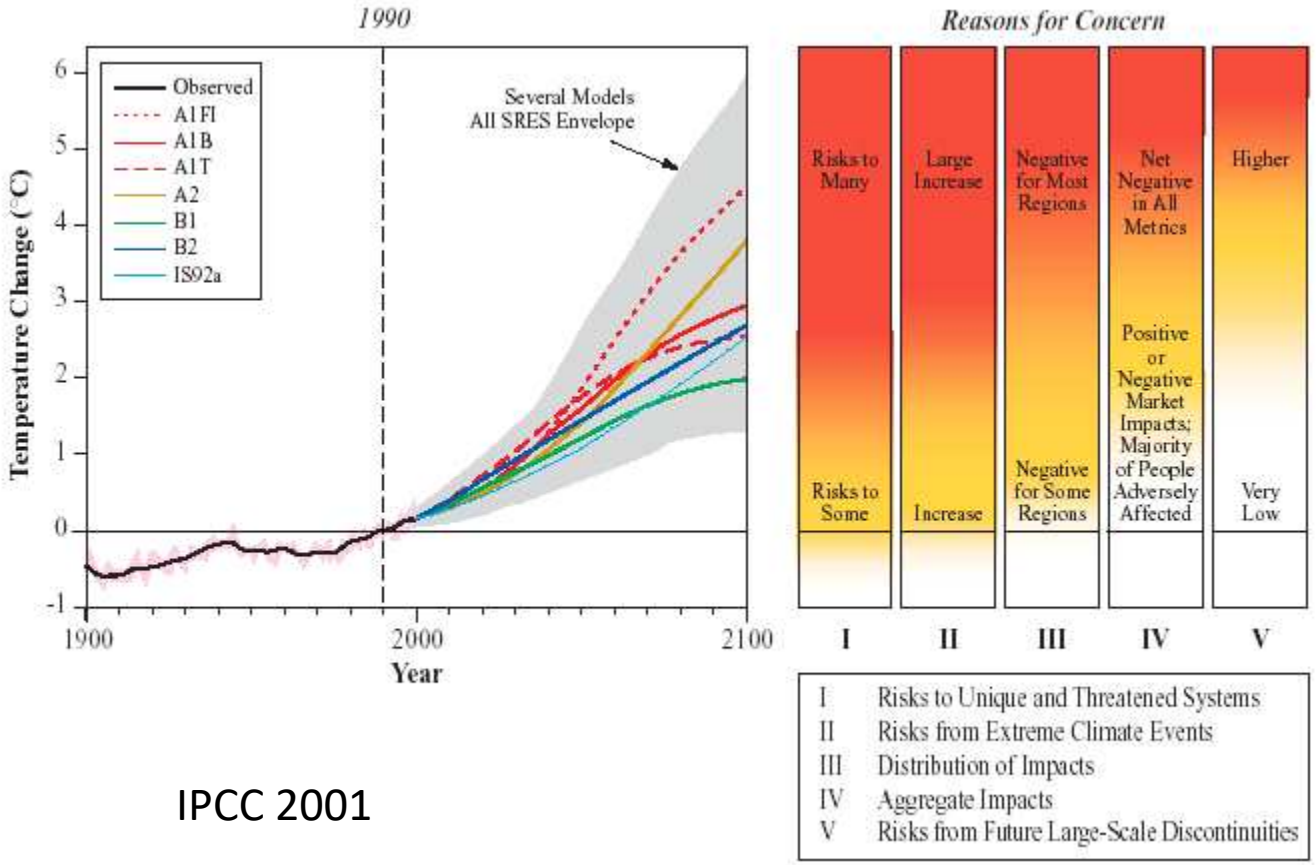
It presents both rapid (storms, etc.) and slow (sea-level rise, etc.) onset events.

There is considerable uncertainty about the kinds of impacts we will experience.

Three things are driving us toward Mega Disasters:-

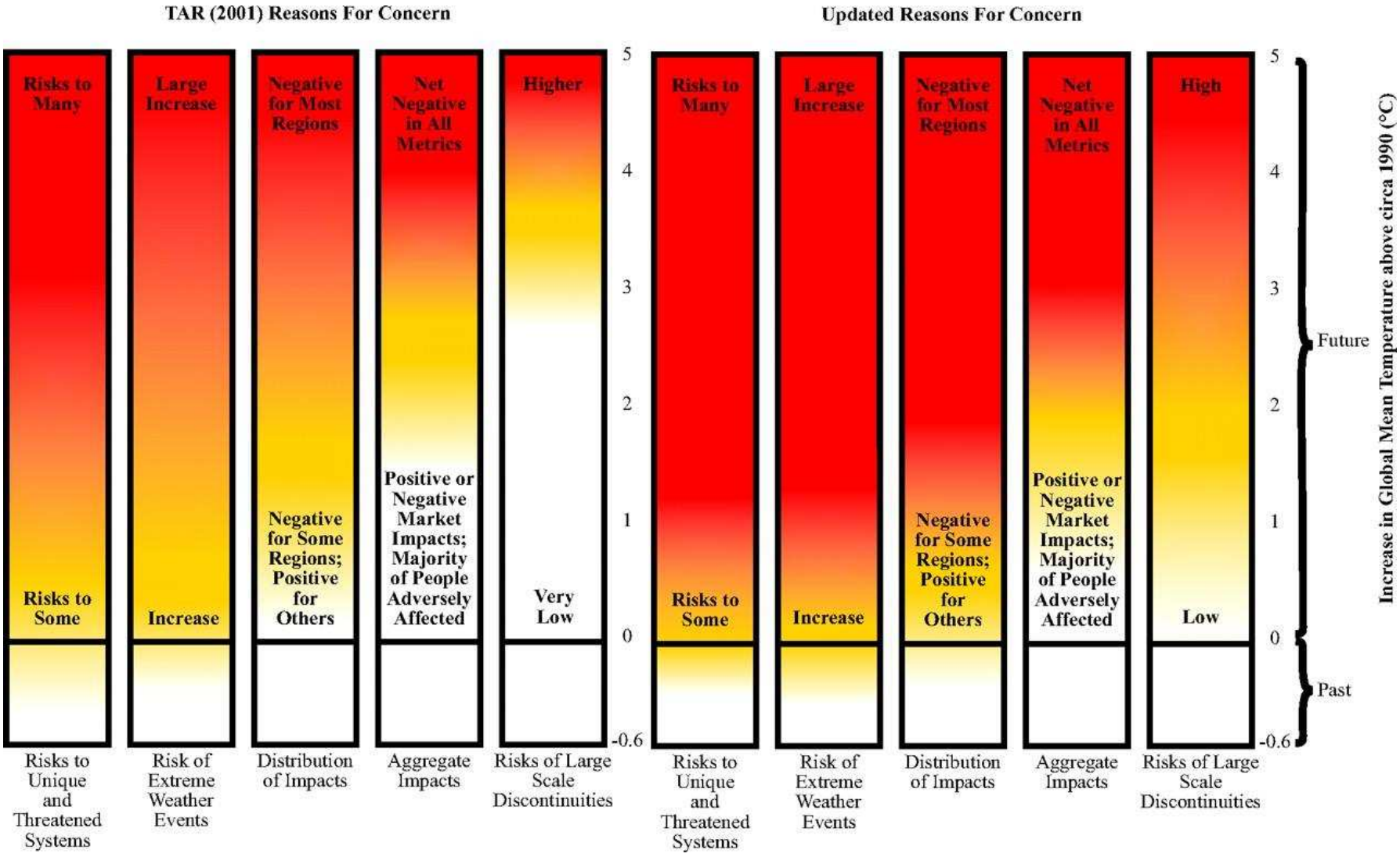
Population growth – 9-10bn by 2050
Urbanisation – 70% by 2050
GHG concentration – 400ppm and rising

Many climate scientists believe we most keep GHG concentration below 450ppm to keep average rise below 2C – many believe we are heading for 4C!



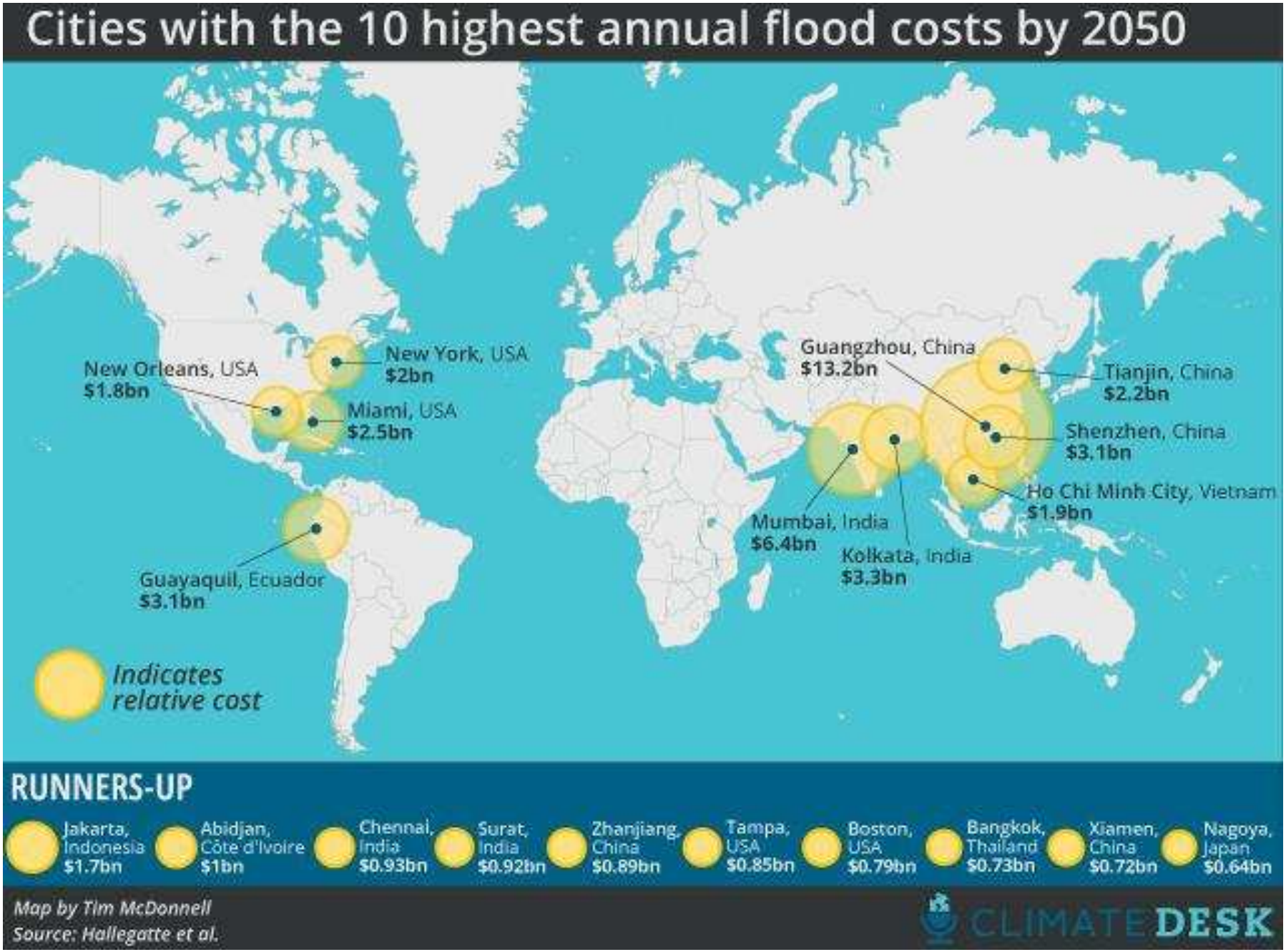
IPCC 2001

Risks from climate change, by reason for concern—2001 compared with updated data.



Joel B. Smith et al. PNAS 2009;106:4133-4137

Many cities will be threatened by SLR and storm surges



UNISDR reports that climate disasters have increased by 14% over last 20 years

(The Human Costs of Weather Related Disasters 1995-2015)

The World Bank reports that 160 countries hold more than one-fourth of their populations in regions of high mortality risks from one or more natural disasters

(Natural Disaster Hotspots: A Global Risk Analysis)

It is very likely that there will be an increase in Mega Disasters such as Storms, Sea Surges and Heat Waves

Places at risk:

USA – high insurance levels

China, India, Philippines and Indonesia – low insurance levels

There are other long term effects summarised by Desai et al 2004
Link: http://www.mikehulme.org/wp-content/uploads/2007/04/2004-dessai-et-al_dangerous.pdf

Danger measured through threshold in physical vulnerability (top down approach):

1. *Large-scale eradication of coral reef systems*
2. *Disintegration of the West Antarctic Ice Sheet*
3. *Breakdown of the thermohaline circulation*
4. *Qualitative modification of crucial climate-system patterns such as ENSO and NAO*
5. *Climate change exceeding the rate at which biomes can migrate*

Danger measured through threshold in social vulnerability (bottom up approach):

1. *Irrigation demand exceeding 50 per cent of annual seasonal water usage for agriculture in northern Victoria, Australia*
2. *Depopulation of sovereign atoll countries*
3. *Additional millions of people at risk from water shortage, malaria, hunger and coastal flooding*
4. *Destabilisation of international order by environmental refugees and emergence of conflicts*
5. *World impacts exceeding a threshold percentage of GDP*

Such images could become more common
Passau in Germany flooded by River Danube 2013

Building Resilience for Mega Disasters

Can we build sufficient resilience to withstand Mega Disasters?

Must address vulnerabilities of infrastructure, communities and people.
(It is reasonable to assume that poorer nations and communities will be more vulnerable than wealthier nations)

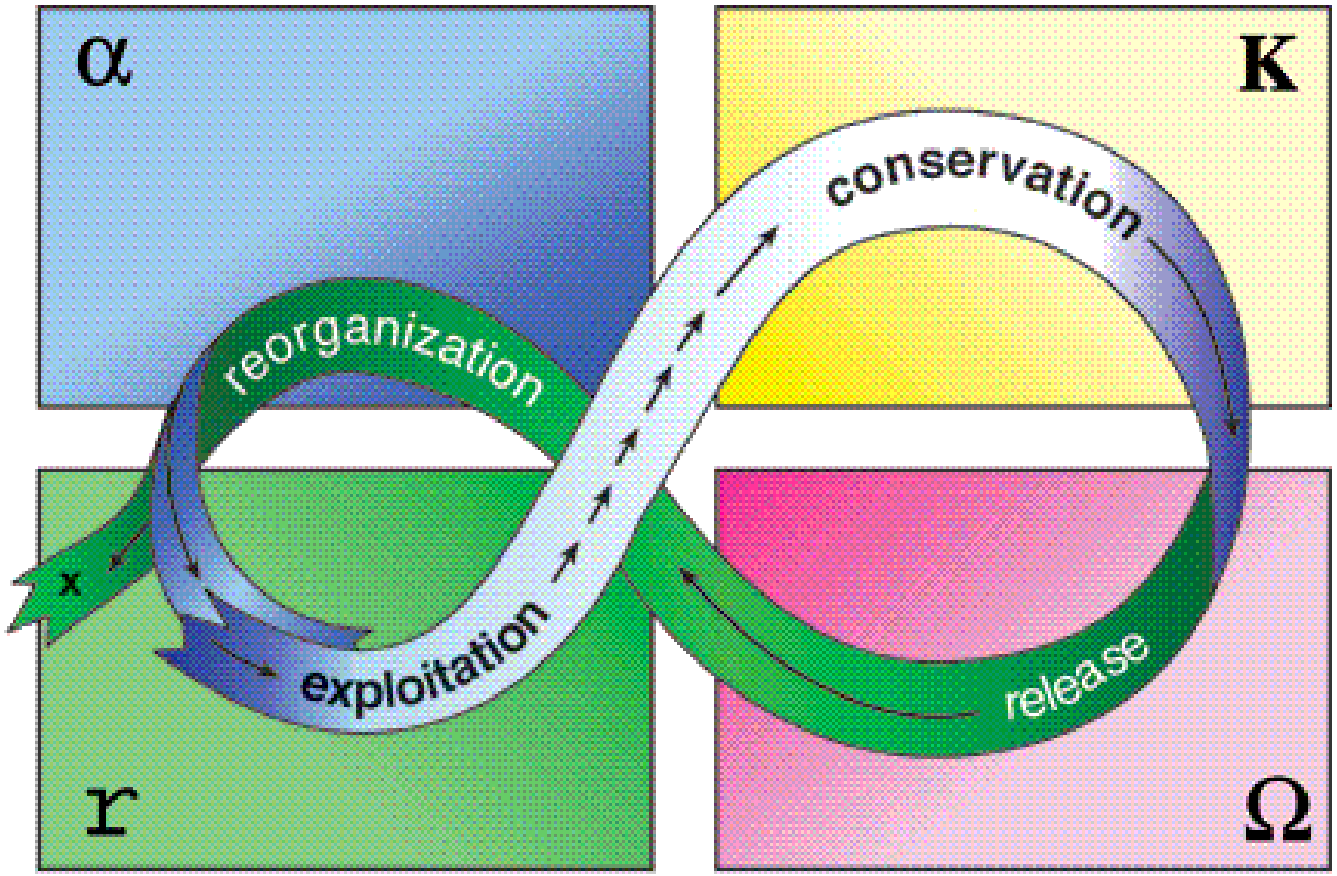
We need to recognise that are huge uncertainties

Must be prepared to be transformative – re-locate vulnerable cities or abandon vulnerable areas of cities.

Effective Early Warning Systems are essential as is Insurance!

Learning (Single, Double and Triple) is vital

Resilience



Exploitation to Conservation can be very long – building a city.
Conservation to Release can be rapid – a flood.
Reorganization is the place where decisions are made - can be chaotic after a storm for example

Dawlish Railway Line, UK

In this case it was decided to re-build the line despite there being an alternative route away from the sea.

Resilience Building

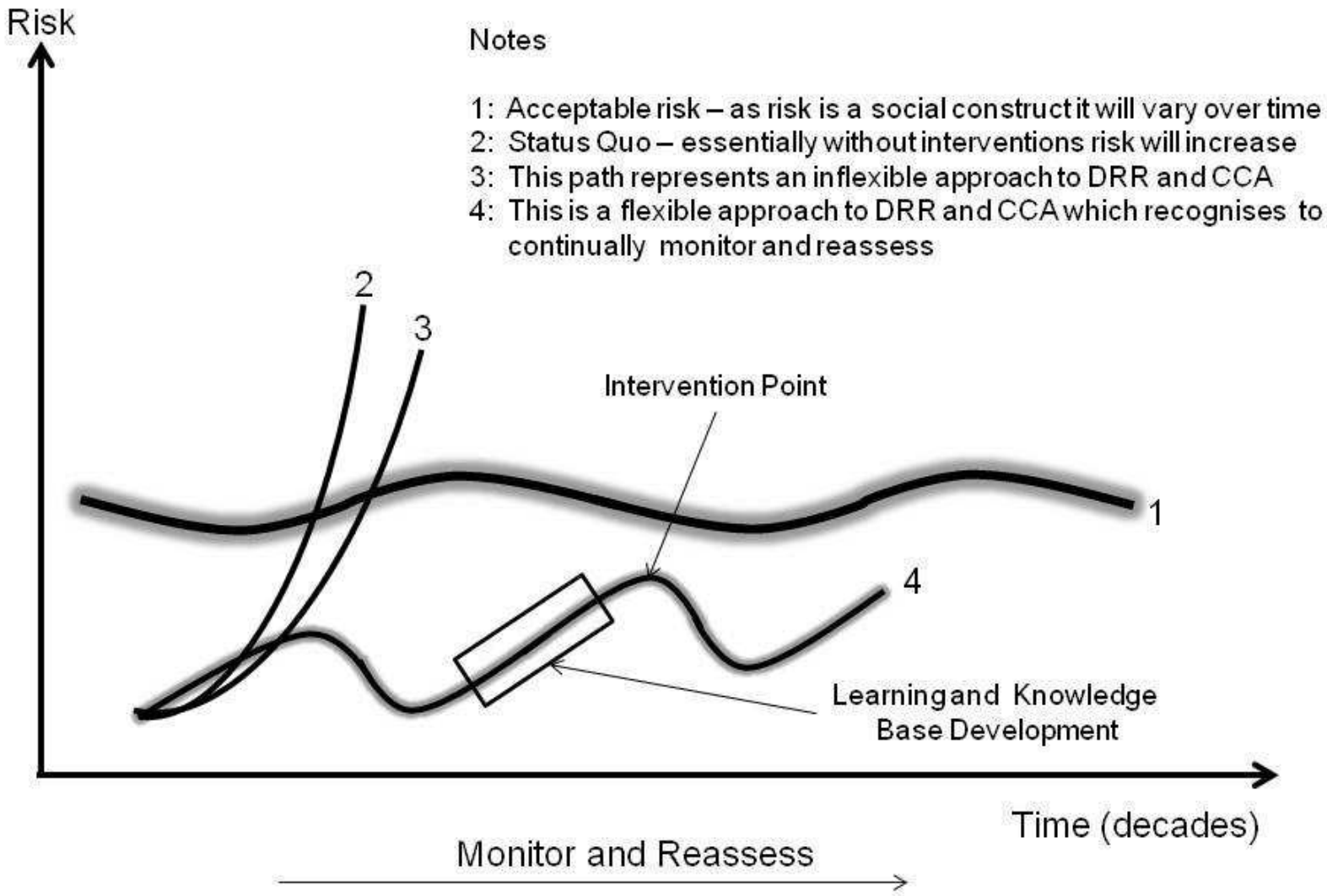
Because of uncertainty there is no easy answer.

Funtowicz and Ravetz (1993) developed a model of Post Normal Science to deal with uncertainty where decision making is democratic as opposed to evidence based.

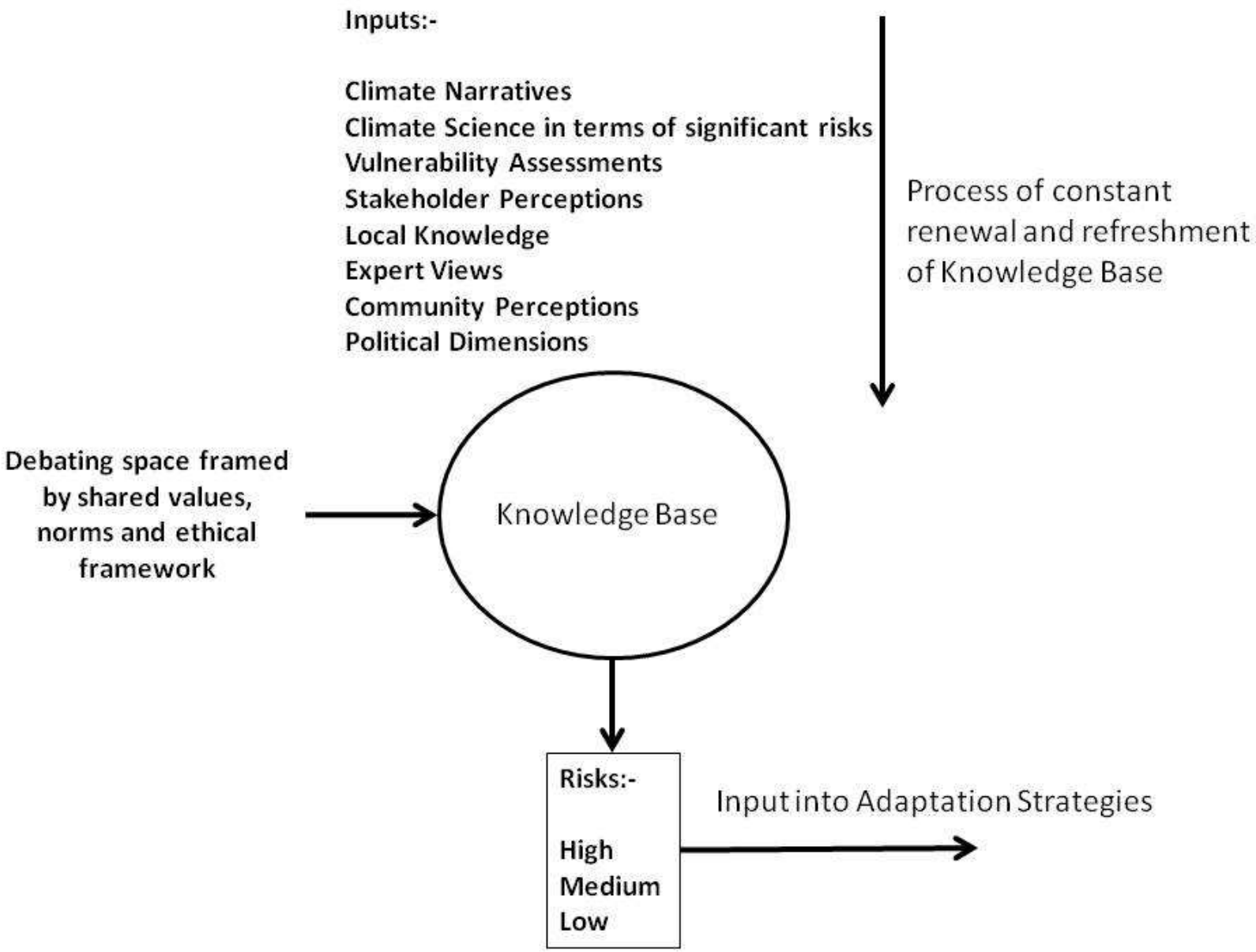
IPCC (2007) propose an iterative approach to decision making.

The IPCC Special Report (2012) Managing the Risks of Extreme Events and Disasters to Advance Climate Adaptation argues that incremental steps through to transformative changes are needed to reduce climate risk.

Based on the Thames Valley Flood Plan Yohe and Leichenko (2010) illustrate an iterative approach


Risk
Notes
1: Acceptable risk – as risk is a social construct it will vary over time
2: Status Quo – essentially without interventions risk will increase
3: This path represents an inflexible approach to DRR and CCA
4: This is a flexible approach to DRR and CCA which recognises to continually monitor and reassess
2
3
Intervention Point
1
4
Learning and Knowledge Base Development
Time (decades)
Monitor and Reassess

For Post Normal Risk Management O'Brien and O'Keefe (2014) propose:-



Resilience Building

Even with The Paris Agreement most scientists believe we will exceed the 2 degree temperature internationally agreed limit - an era of dangerous climate change which will produce Mega Disasters.

Can we build sufficient resilience to cope with Mega Disasters?

Yes, I believe it is possible but ….

As Einstein noted not with the same thinking that lead to the problem.

The Global Assessment Report (2015) asserts that for disasters there is too great a focus institutions and not on the underlying causes of risk

We need to think of Resilience Building as a transformative process.

And we should not be afraid of making difficult decisions!!

Thank You

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